Protective cover for motor vehicles

The invention relates to a protective cover for motor vehicles, motor vehicle parts, machines or the like according to the preamble of claim 1.

Such protective covers for motor vehicles, machines or the like are intended for preventive protection of the surfaces both against abrasive or chemical emissions, such as for example dust, film rust, bird droppings, condensation moisture and dust moisture and penetrating moisture and against mechanical damage, such as for example scratch and abrasion damage and consequential damage during periods of standing, storage and transport.

Protective covers made of plastic or of textile tarpaulins coated with plastic in which motor vehicles, machines and other objects to be protected are enclosed have become known, the tarpaulin covering being fastened by additional attachment of adhesive strips or lashed with ropes or cords. Such a protective cover is known from DE 199 04 140 A1 for example. These tarpaulins are characterized by a speed-dependent lifting-off or inflation being caused by the relative wind during transport. This leads to ballooning or to flapping of the covering material and consequently to mechanical stress, in particular of the surface of the object to be protected, and to damage thereof.

The flexible packing for a motor vehicle known from DE 199 04 140 A1 comprises a protective cover made of an elastic material which is adapted in shape to the motor vehicle to be packed, grips under the entire vehicle as far as the lower edge and can be tightened on the body by means of tensioning pulls acting on its edges. In the region of the wheel houses, cut regions are provided, which do not cover the front wheel cutouts. There is full coverage in the rear region.

In the region of the wheel arches, this protective cover has the disadvantage that air can flow directly under the packing of the front wheel cutouts while underway and consequently inflates the protective cover. In the rear portion, the full coverage has the disadvantage that the rear wheels are not accessible in order for example to top the tires up with air or to change a wheel. Moreover, the protective cover does not fit snugly against the vehicle in this region. It is consequently possible for the relative wind to penetrate in this region as well, which results in inflation and also the material striking the vehicle surface during transport, which in turn leads to surface damage.

The invention is therefore based on the object of producing a protective cover which protects the object to be protected optimally over its entire surface and can be adapted to different surface shapes, in particular wheel arches, ensures a secure fit of the protective cover during transport and makes it possible for the protective cover to be easy to handle and usable at least once.

According to the invention, this object is achieved by a protective cover for motor vehicles, motor vehicle parts, machines or the like with the features of claim 1. The dependent claims relate to advantageous designs and developments of the invention.

By virtue of the design according to the invention of at least one flat strip-shaped holding element in a pocket, which are provided on the protective cover and are in each case assigned to the edge(s), it is made possible for these holding elements in a holding position to act under prestress on the edge(s). By virtue of the holding element which acts under prestress on the edge of the object to be protected,

independent drawing-close or fixing takes place of the covering which is adjacent to the edge of the object to the protected. By virtue of this, air is prevented from finding its way under the protective covering in this region while underway, as a result of which inflation and impact of the cover material is prevented at least in the region of the edge.

According to a preferred embodiment, the edges are provided, on the object to be protected, at the wheel arches and/or an engine hood edge close to the windshield. By virtue of this, these regions can fit snugly against the object to be protected.

Furthermore, this design has the advantage that self-centering of the holding elements in relation to the wheel arch or in relation to the engine hood takes place, which brings about an improvement in the shape-adaptation of a protective cover to the geometry of the wheel arch or engine hood edge and also to other geometries of objects to be protected which have a circular-arc-shaped, curved or elliptical shape or the like.

The invention also has the advantage that the action of the flat strip-shaped holding element on the wheel arches or the engine hood edge makes possible versatile and flexible use as this action on the wheel arches or the engine hood is made possible independently of the casings formed behind or coverings which are adjacent to the wheel arch or the engine hood edge.

According to an advantageous development of the invention, the width of the holding elements of flat strip-shaped design is larger than a folded-over edge or bead of the wheel arches or the engine hood edge. By virtue of this, secure positioning of the protective cover is made possible without it being possible for it to come away independently owing to air flowing behind

it. At the same time, flow-favorable bearing of the holding element against the wheel arch or the engine hood is provided.

The radius of curvature of the flat strip-shaped holding element is in its preferred embodiment larger than the radius or course of curvature of a wheel arch or the engine hood edge. This makes it possible for the holding element after positioning to be positioned under prestress in relation to a portion of the protective cover adjacent to the wheel arch or the engine hood edge. A folding effect for fixing the holding elements to the edge or the wheel arch and/or the engine hood edge is achieved. When the protective cover is fitted, the flat strip-shaped holding element projects outward at an angle in relation to the edge. By moving the holding element inward toward the edge, folding over or snapping over of the holding element is brought about, by virtue of which the holding element bears against the edge under prestress and acts on it in a position directed toward the inner side of the edge. This folding effect is achieved by reducing the radius of curvature of the holding element in relation to its original shape in the installed state on the protective cover, and the holding force is generated.

Advantageously, when the holding force is increased by prestressing the flat strip-shaped holding element in the protective cover, the difference between the radius of curvature of the holding element and of the course of curvature of the wheel arch or the engine hood edge is increased. By virtue of this, it is possible to achieve a secure fit of the protective cover, at least in the portion of the fastening, even at relatively high traveling speeds during transport, such as for example on a train or while the motor vehicle is underway from one loading location to the next.

The holding element is preferably produced by punching, milling, injection molding, deep drawing, extrusion or calendering. Any materials with flexible properties can be used, preferably plastic materials produced by a punching process.

The folding effect for achieving the holding force on the wheel arches or the engine hood edge is preferably achieved by a flat rectangular cross section. The width of the holding element comprises a multiple of its thickness. Band-shaped material is preferably provided, so that the construction in the protective cover is also kept small.

According to a preferred embodiment, the flat strip-shaped holding element is inserted completely into a pocket. The holding element is then in a rest position, without a force for changing the shape being applied.

The pocket for receiving at least one holding element is preferably fabricated from a material corresponding to the protective cover. Its contour is adapted to the geometry of the holding element and is preferably slightly larger, so that in a preferred development the pocket surrounds the holding element in a relatively snugly fitting manner.

In a preferred embodiment, the pocket for receiving the at least one holding element is closed by sewing, welding or bonding.

According to a preferred embodiment, the sewing, welding or bonding is carried out by a CNC-operated device. For example, a layer of a material web or for each holding element a precut material web is arranged on a machining table. The holding element is then positioned in relation to the first layer. A second layer is positioned in analogy to the first layer, and

the pocket is then closed by a tool by means of sewing, welding or bonding.

According to a preferred embodiment of the invention, the holding element is of two-part or multi-part design. This design has the advantage that, in the case of automatic fabrication by punching, milling or the like for example, production of the holding elements which is optimized in terms of material and a reduction of waste are made possible. The holding elements mostly have a course of curvature which is adapted to the contour of the wheel arch or the engine hood edge of a particular motor vehicle and to be precise at the time when the holding element is enclosed in the pocket and fastened to the protective cover. By virtue of this, different radii and courses of curvature can occur in a rest position along an outline of the flat strip-shaped holding element, as a result of which the spacing of the holding elements in relation to one another in order to punch a number of holding elements out of a preferably sheet-shaped material is in some cases considerable. The holding elements are therefore at least halved in order to obtain a large number of holding elements from a given sheet size and for example to keep the manpower for punching small, as a result of which costs for the machines can in turn be reduced. Furthermore, this two-part or multi-part design of the holding elements has the advantage that smaller individual pockets can be formed, as a result of which the machining areas of automatic machines can be kept small, so that the investment costs for producing the holding elements remain low.

The multi-part holding element has a separating line between the individual portions. This line is advantageously provided in such a way that portions of the same size are provided, that is the separating lines are provided at regular spacings over the entire extent of the holding element. This makes it possible

to optimize the production process. In addition, symmetries can be formed, which support the holding function.

According to a preferred embodiment, a two-part holding element is provided, the separating line of which is provided at the apex of the wheel arch. This makes small packing dimensions possible in the non-use state at least.

According to another advantageous development of the invention, each half of the holding element is inserted into a separate pocket. This makes cost-effective mass production possible.

Alternatively, provision is likewise advantageously made that each half of the holding element is inserted or enclosed in a common pocket and a seam is provided in the region of the separating line. By virtue of this, the halves are positioned in relation to one another in the pocket in order to form a quasi continuous holding element.

Furthermore, according to an alternative design of the two-part holding element, provision is made that a positive, non-positive and/or material connection of the two halves is provided before the insertion of a first and second half of the holding element into a common pocket. This positive, non-positive and/or material connection of course also applies to multi-part holding elements, consisting of a first and at least one further portion, which may be of the same or different design in terms of size, shape and material.

After the insertion of the holding element or the portions of the holding element into the pocket or pockets, the pocket(s) is (are) arranged on a protective cover portion which is adapted to the shape of a wheel arch or the engine hood edge, that is to the

outer contour thereof. During this arrangement operation, the holding element is brought out of its rest position, the spacing between the two free ends being reduced, as a result of which the flat strip-shaped holding element is positioned at an angle. This brings about the prestress. Owing to the flexible properties and the thickness of the strip-shaped holding element, which is smaller by a multiple than the width of the holding element, easy folding-over from a non-use position into a holding position and vice versa can take place and sufficient holding force can be achieved in a holding position.

The invention and other advantageous embodiments and developments of it are described and explained in greater detail below with reference to the example illustrated in the drawing. The features which can be understood from the description and the drawing can be applied according to the invention individually or as several together in any combination. In the figures:

Figure 1 shows a perspective view of a motor vehicle with a protective cover;

Figure 2 shows a diagrammatic illustration of a holding element arranged in a pocket;

Figure 3 shows a diagrammatic illustration of a holding element arranged in a pocket, which is arranged on the protective cover in the cut region for a wheel arch;

Figure 4 shows a diagrammatic illustration of a holding element in a non-engagement position along the line IV-IV in Figure 1;

Figure 5 shows a diagrammatic sectional illustration of a holding element in a holding position along the line IV-IV in Figure 1;

Figure 6 shows a diagrammatic illustration of a two-part holding element;

Figure 7 shows a diagrammatic illustration of a portion of a holding element during multiple production;

Figure 8a shows a diagrammatic illustration of portions of the holding elements during introduction into pockets during automatic fabrication;

Figure 8b shows a diagrammatic sectional illustration along the line VIII-VIII in Figure 8a;

Figure 9 shows a diagrammatic illustration of two-part holding elements in a pocket, and

Figure 10 shows an alternative design of two-part holding elements in a pocket.

Figure 1 illustrates a protective cover 11, which is fitted on a motor vehicle. This protective cover 11 is, for example, of one-piece design and has, according to customer wishes, various trimmed regions. In the embodiment illustrated, a trimmed region 13 for the windshield, a trimmed region 14 for the driver door, a trimmed region 16 for attaching vehicle papers or identification data for a vehicle and a trimmed region 17 for the radiator opening are provided. Other regions can be provided optionally. For fastening the protective cover 11 in the sill region, parts or tensioning belts are provided, for example, which act on closing elements 18.

The protective cover 11 is preferably made from a plastic material, which is designed to be impermeable to water, dirt and oil from the outside to the inside and impermeable to air, water vapor and light from the inside to the outside. For example, the protective

cover 11 is made from a polypropylene nonwoven according to DIN 6001, PP nonwoven for short, the nonwoven construction of which is according to DIN 61210 characterized by a filament nonwoven and the bonding of which is according to DIN 611210 characterized by thermal bonding. The nonwoven material has a tearing strength in the longitudinal direction of at least 100 N/5 cm and in the transverse direction of > 25 N, for example. In this case, the weight of the material is 70 g/m^2 +- 10 g/m^2. Use can of course also be made of other materials.

The protective cover 11 comprises a front and rear wheel arch covering 21, which is adapted to the shape of the fender and the course of the wheel arch 22. This makes it possible for the wheels to be freely accessible. It is nevertheless necessary for the wheel arch covering 21 to be fixed in relation to the wheel arch 22 in order that no problems occur during transport, in particular when the front wheels are steered. It is necessary moreover for there to be a secure fit of the wheel arch covering 21 in relation to the wheel arch 22 so as to avoid the disadvantages mentioned in the introduction.

For fastening the wheel arch covering 21 in relation to the wheel arch 22, a holding element 24 is provided, which is illustrated in greater detail by way of example in Figures 2 to 6, 9 and 10.

The holding element 24 is formed from a flat strip-shaped material, which has a curved shape. This curved shape or sickle-shaped profile of the holding element 24 emerges from Figure 2, for example. A flexible plastic material is preferably used. The wall thickness of the holding element 24 is 1 to 2 mm for example, whereas its width is 2 to 4 cm for example. The length of the holding element 24 is adapted to the particular wheel arch of the vehicle 12 to be protected. Composite

materials made of two or more layers can be provided as other materials for the holding element, as can metal and non-metal materials and also paperboard, cardboard or fiber-reinforced plastics or the like.

The holding element 24 is inserted into a pocket 26. This pocket 26 preferably consists of the same material as the other portions of the protective cover 11. The pocket 26 comprises a first layer 51 (Figure 8b), on which the holding element 24 is placed. A second layer 52 follows over this, and the first and second layers 51, 52 are interconnected by at least one seam 53 by sewing, welding or bonding. The holding element 24 is advantageously completely enclosed in the pocket 26. Alternatively, the pocket 26 may be formed only in places and surround the holding element 24 partly. For example, the ends 27 and individual central portions may be provided in order to form a pocket 26. After its production, the pocket 26 has, for example, the contour illustrated in Figure 2. In this connection, an edge strip 28 is provided, which is intended for connection to the wheel arch covering 21. Advantageously, portions of the protective cover material precut for forming the pocket 26 can be used in order to form the pocket according to Figure 2.

The pocket 26 produced according to Figure 2 is sewn onto the wheel arch covering 21. In this connection, the radius of curvature 31 of the holding element 24 sewn into the pocket 26 in a rest position is adapted to the radius of curvature 32 of the wheel arch 22 and reduced. This results in the position of the holding element 24 being adjusted, as illustrated in Figure 4, for example.

As an alternative to the procedure for fastening the holding element 24 described in Figures 2 and 3, the holding element 24 can be surrounded and fixed directly by a portion arranged on the wheel arch covering 21.

This makes it possible to design the pocket 26 in one piece with the wheel arch covering 21.

Figure 4 illustrates a section along the line IV-IV according to Figure 1. After the protective cover 11 has been fitted on the motor vehicle 12, the holding element 24 is arranged in the starting position illustrated in Figure 4. For fixing the wheel arch covering 21 in relation to the wheel arch 22, the holding element 24 is folded over inward according to arrow 36, so that the free end of the holding element 24 points toward the wheel house, that is toward the vehicle center. The holding element 24 bears under prestress with a holding force according to arrow 38 against the wheel arch 22, that is a folded-over edge 35 of the wheel arch 22, and fixes the wheel arch covering 21 over the full extent. Rubber elements or other tensioning elements can be provided in the transition to the sill region, so that the protective cover 11 fits fully against the fender. Removal of the protective cover 11 only requires the holding element 24 to be folded back out of its holding position 37 into the non-engagement position 34.

Owing to the positioning of the holding element 24 with a smaller radius than its starting state, a folding effect is achieved, which, in addition to the fixing, also makes possible centering and independent adaptation of the holding device to the wheel arch 22. The configuration of the holding element 24 in a holding position 37 furthermore has the advantage that a wind-repellent surface is produced, so that additional inflation of the protective covering is prevented. By virtue of the independent drawing-close, as emerges from Figure 5, a protective covering 11 fitting tightly against the fender is furthermore produced. In this connection, the design of a wheel house 39 can follow the wheel arch 22 in any way and

the holding function of the holding elements 24 is ensured.

Furthermore, according to the invention, an alternative design of the holding element 24 is illustrated and its production is described in greater detail in Figures 6 to 10. In Figure 6, a two-part holding element 24, which comprises a first portion 41 or first half 41 and another portion 42 or second half 42, is illustrated in a pocket 26. The first half 41 and the second half 42 are preferably of identical design and arranged symmetrically in relation to the separating line 43. The radius of curvature or curved shape of the first and second halves 41, 42 for forming a holding element 24 is only an example, as is the design of the ends 27, the contour of which can be adapted to different shapes or transition regions from the wheel arch 22 to the sill. The halves 41, 42 of the holding element 24 have bores 46, which during automatic production serve for positioning and fixing in relation to one another and in relation to a lower layer 51 of a pocket 26.

The separating line 43 between the first and second halves 41, 42 is preferably provided at the apex. Alternatively, an asymmetrical arrangement can also be provided, so that the half 41 is designed to be larger than the half 42 or vice versa.

In the illustrative embodiment according to Figure 6, a pocket 26 is formed, which receives the holding element 24. In order to avoid overlapping or displacement of the halves 41, 42 relative to one another, a plug-type connection (not illustrated in greater detail) is provided, which positions the two halves 41, 42 in relation to one another. In principle, any non-positive, positive and/or material connections can be provided.

Figure 7 illustrates a sheet 48, from which for example four halves 41, 42 can be punched out. Depending on the sheet dimensions and also on the size and shape of the halves 41, 42, a different number of halves 41, 42 can be punched out. Other forms of production are likewise possible. Production which is optimized in terms of material is possible by virtue of dividing the holding element 24 in two. The interspaces 49 lying between the individual halves 41, 42, which constitute waste, can consequently be kept extremely small as the shorter design of a portion in comparison with the overall length of the holding element 24 allows the individual portions to be arranged with a smaller interspace 49 in relation to one another.

Figures 8a and b illustrate by way of example an arrangement of a half 41 or 42 in order to carry out CNC-driven production of the pockets 26. For example, three first layers 51, which have a precut contour, are arranged on a machining table. The half 41 or 42 is then applied. The second precut layers 52 are then placed over this in order to close the pocket 26. For this purpose, seams 53 are introduced by sewing, welding or bonding, as emerges for example from Figure 8b.

As an alternative to this procedure, a first layer 51 can also be formed by a continuous material web, to which the individual halves 41 or 42 are applied, in order then to be covered together by a second layer. Following the formation of the seams 53, the individual pockets 26 can be separated.

Figure 9 illustrates an alternative embodiment of the two-part arrangement of a holding element 24. In this embodiment, the pockets 26 illustrated in Figure 8a are connected by a connecting seam 56 to form a common pocket 26.

Alternatively, it is possible for a first layer 51 to be provided for receiving the halves 41 and 42 and a second layer to cover the halves 41 and 42, the seams 53 and 56 being introduced subsequently. By virtue of this, the halves 41 and 42 are arranged separately from one another in a common pocket 26. This last-mentioned form of production can also be integrated in an automatic process.

Figure 10 illustrates a further alternative embodiment to Figures 6 to 9. The halves 41 and 42 are interconnected by seams 58. Advantageously, reinforcing strips or support elements 59 can be provided on one side or both sides in order that the portions 41, 42 of the holding elements 24 are arranged in alignment with one another. These halves 41, 42, which are positioned in relation to one another in a separate operation, are inserted into a pocket 26 and sewn in, as has been described for example with reference to Figures 2 and 3. This embodiment according to Figure 10 is also intended for process automation.

Figures 6 to 10 are described by way of example for but not limited to a two-part holding element 24. Multi-part holding elements can likewise be provided in the form of portions 41, 42 arranged in one or more pockets 26. The at least two-part design of the holding element 24 also makes it possible for the portions 41 and 42 to differ from one another and for production nevertheless to be cost-effective. The portions 41, 42 or other portions for forming a holding element 24 can differ from one another in terms of material, material thickness and curvature and also shape and design and can be combined with one another in any way. If in the case of a curved body edge, for example, different application forces or holding forces are to be provided in order to fix a protective cover in relation to this body edge, it is possible for different materials or material combinations to be used for forming a holding

element. In the case of wheel arches, for example, a more rigid material can be provided in a transition region to the sill, whereas a flexible material is used at the apex of the wheel arch. This can be effected by way of a different choice of plastics or composite materials or by way of metal materials in combination with plastics. The width of the holding elements and their cross section, shape and profile can likewise be adapted to the different applications.

The statements above apply similarly for at least one holding element 24 which in a holding position acts under prestress on an engine hood edge 25 for fastening the protective cover 11.